

FORM PTQ-1390 (REV. 9-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER 306.41404X00 filed March 14, 2002
<b>TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371</b>			U.S. APPLICATION NO. (if known, see 37 CFR 1.5) <b>10/071000</b>
INTERNATIONAL APPLICATION NO PCT/EP00/08897	INTERNATIONAL FILING DATE September 12, 2000	PRIORITY DATE CLAIMED September 27, 1999	
TITLE OF INVENTION <b>TRIGGERING UNIT CONTROLLED BY A MICROPROCESSOR FOR INITIATING PYROTECHNICAL ELEMENTS</b>			
APPLICANT(S) FOR DO/EO/US <b>HUMMEL, DIRK PETZOLD, JAN SCHAFFER, HEINZ ZEMLA, ANDREAS</b>			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a <b>FIRST</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a <b>SECOND</b> or <b>SUBSEQUENT</b> submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is transmitted hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office(RO/US)</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input checked="" type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p><b>Items 11 to 20 below concern document(s) or information included:</b></p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A <b>FIRST</b> preliminary amendment.</p> <p>14. <input type="checkbox"/> A <b>SECOND</b> or <b>SUBSEQUENT</b> preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification.</p> <p>16. <input checked="" type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input checked="" type="checkbox"/> Other items or information: <b>Fig. 1, Credit Card Payment Form, PCT Request Form, International Preliminary Examination Report, International Publication Number WO 01/23827</b></p>			

U.S. APPLICATION NO. (If known, see 37 CFR 1.5) <b>107077000</b>		INTERNATIONAL APPLICATION NO. <b>PCT/EP00/08897</b>		ATTORNEY'S DOCKET NUMBER <b>306.41404X00</b>	
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<p>21. The following fees are submitted.</p> <p><b>BASIC NATIONAL FEE (37 CFR 1.492(a) (1) - (5)):</b></p> <p><input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1040.00</b></p> <p><input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO .. ..... <b>\$890.00</b></p> <p><input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO... .. <b>\$740.00</b></p> <p><input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4)..... <b>\$710.00</b></p> <p><input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b></p> <p style="text-align: center;"><b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b></p> <p>Surcharge of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:20%;">CLAIMS</th> <th style="width:20%;">NUMBER FILED</th> <th style="width:20%;">NUMBER EXTRA</th> <th style="width:20%;">RATE</th> <th style="width:20%;">\$</th> </tr> <tr> <td>Total Claims</td> <td>12 - 20 =</td> <td>0</td> <td>x \$18.00</td> <td>\$</td> </tr> <tr> <td>Independent Claims</td> <td>1 - 3 =</td> <td>0</td> <td>x \$84.00</td> <td>\$</td> </tr> <tr> <td colspan="3">MULTIPLE DEPENDENT CLAIMS(S) (if applicable)</td> <td>+ \$280.00</td> <td>\$</td> </tr> <tr> <td colspan="4" style="text-align: right;"><b>TOTAL OF ABOVE CALCULATIONS =</b></td> <td><b>\$890.00</b></td> </tr> </table> <p><input type="checkbox"/> Applicant claims small entity status See 37 CFR 1.27 The fees indicated above are reduced by 1/2. + \$</p> <p style="text-align: right;"><b>SUBTOTAL = \$890.00</b></p> <p>Processing fee of <b>\$130.00</b> for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)). \$</p> <p style="text-align: right;"><b>TOTAL NATIONAL FEE = \$890.00</b></p> <p>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). <b>\$40.00</b> per property + \$</p> <p style="text-align: right;"><b>TOTAL FEES ENCLOSED = \$890.00</b></p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width:60%;"></td> <td style="width:20%; text-align: right;">Amount to be refunded:</td> <td style="width:20%; text-align: right;">\$</td> </tr> <tr> <td style="text-align: right;">charged:</td> <td style="text-align: right;">\$</td> </tr> </table>	CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	Total Claims	12 - 20 =	0	x \$18.00	\$	Independent Claims	1 - 3 =	0	x \$84.00	\$	MULTIPLE DEPENDENT CLAIMS(S) (if applicable)			+ \$280.00	\$	<b>TOTAL OF ABOVE CALCULATIONS =</b>				<b>\$890.00</b>		Amount to be refunded:	\$	charged:	\$	<p style="text-align: center;"><b>CALCULATIONS PTO USE ONLY</b></p>
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	Amount to be refunded:	\$																													
	charged:	\$																													

a. ☐ A check in the amount of \$\_\_\_\_\_ to cover the fees is enclosed.

b. ☐ Please charge my Deposit Account No. **01-2135** in the amount of \$\_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. **01-2135**. A duplicate copy of this sheet is enclosed.

d. ☒ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

**Antonelli, Terry, Stout & Kraus, LLP**  
 1300 North Seventeenth Street  
 Suite 1800  
 Arlington, VA 22209  
 USA

SIGNATURE  
 Alan E. Schiavelli  
 NAME  
 32,087  
 REGISTRATION NO

306.41404X00

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants: HUMMER et al

Serial No.:

Filed: March 14, 2002

For: Triggering Unit Controlled By A Microprocessor For  
Initiating Pyrotechnic Elements

Group:

Examiner:

**PRELIMINARY AMENDMENT**

Assistant Commissioner  
for Patents  
Washington, D.C. 20231

March 14, 2002

Sir:

Prior to examination on the merits of this application and prior to calculation  
of the filing fee, please amend the above-identified application as follows:

**IN THE CLAIMS:**

Please amend the claims to read as follows:

4. (Amended) Method for operating a triggering unit according to claim 1,  
characterised in that the microprocessor (20) is loaded with a programme  
corresponding to the current requirements during production of the triggering unit or  
at least before use thereof.
7. (Amended) Method according to claim 4, characterised in that the microprocessor  
(20) can also process internet protocols.
8. (Amended) Method according to claim 4, characterised in that the operating

software is implemented at random instants on an unprogrammed triggering unit or higher order subassembly (such as detonators).

9. (Amended) Method according to claim 4, characterised in that the programming lines of the microprocessor are used as data inputs and outputs.

10. (Amended) Method according to claim 4, characterised in that the switching output (24) can be reinforced by discrete components.

11. (Amended) Method according to claim 4, characterised in that communication between the triggering unit and the ignition device can be uni- or bi-directional in a demand-driven manner.

12. (Amended) Method according to claim 4, characterised in that the triggering unit and the ignition device can communication using various media, such as metallic conductor (cable), optical fibre, ultrasound or high frequency.

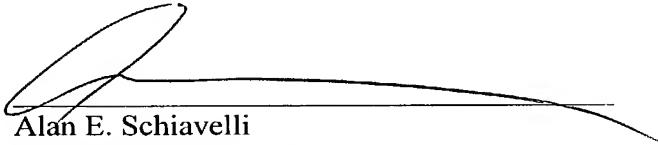
REMARKS

The foregoing amendments are respectfully requested prior to examination on the merits of this application. A marked up copy of the amended claims is attached.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 306.41404X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

  
 Alan E. Schiavelli  
 Registration No. 32,087

AES/jla  
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- 1

1/p,ls

Triggering unit controlled by a microprocessor for initiating pyrotechnic elements

5 The invention relates to a triggering unit for initiating pyrotechnic elements in accordance with the preamble of the first claim and to a method for operating this triggering unit.

10 Pyrotechnic elements are taken to mean all elements which trigger a pyrotechnic effect owing to the application of an electrical voltage, preferably in conjunction with coded signals, the effect having a desired result, for example the ignition of an explosive charge, triggering of a gas generator, an air bag, the  
15 ignition of large fireworks or sprinkler units and fire extinguishers. Therefore, pyrotechnic elements include *inter alia* igniters, in particular detonators for civil and high security sectors (automotive, military and oil field), ignition elements, belt tighteners and gas  
20 generators.

All electronic igniters known on the market consist in the triggering unit of the components: control module (customised chip), rectifier, energy store, voltage  
25 regulator, data coupler, current limiter and suppressor circuit.

The logic or the sequencing control is provided by a control module specially developed for an application  
30 and therefore predetermining its function-specific properties by its control logic, converted in the chip structure. Each change in the logic or the function requires redesigning of the chip. Such redesigning is coupled with high costs and time expenditure as in most  
35 cases it is necessary to change the complete masking set. The remaining peripherals (rectifier, energy store,

voltage regulator, data coupler, current limiter etc.)  
are generally unaffected during redesigning.

The object of the invention is to introduce an  
5 electronic triggering unit according to the preamble of  
claim 1, which triggering unit makes possible a hitherto  
unknown variety of properties and functionality without  
changes in the hardware or the chip design being  
necessary.

10 This object is achieved by using a standard  
microprocessor with integrated programme memory as  
control component loaded with a programme corresponding  
to current requirements during production or at least  
15 before the triggering unit is used.

Any desired type of electronic triggering unit can be  
produced using this principle without changes in the  
hardware having to be made (design and structure of the  
20 electronic triggering/control device).

It is possible to produce all conceivable electronic  
triggering units, such as for detonators, air bags etc.,  
on a production plant without having to intervene in the  
25 production sequence as the respective triggering  
characteristic is determined exclusively by the software  
(programme) loaded into the triggering unit.

A processor-based electronic triggering unit can  
30 therefore emulate all systems known on the market.

A plurality of systems may even be combined in one  
programme depending on the programme memory capacity.  
This triggering unit can then independently detect which  
35 properties it is to assume with the aid of the control



signals. A further advantage consists in the fact that any programmable microprocessors can be used. Therefore, dependence on a single supplier or chip manufacturer is done away with.

5

In addition to many other features, the microprocessor used according to the invention has an internal oscillator which can preferably be calibrated by software, a writable programme memory, a data memory, data inputs and outputs and a switching output. A data coupler, a rectifier, a voltage regulator and an energy store are required as peripheral components. It is also conceivable for these peripheral components to be integrated completely or partially in the microprocessor.

15

The use of this invention also realises a large number of possibilities which cannot be achieved using conventional chip technologies. These include, for example:

20

Implementing customised requests, such as special security removal sequences etc.

Microprocessor technology is so far advanced that, in the meantime, internet-ready single chip microprocessors comprising all interfaces and protocols for use on the internet are obtainable commercially. When using a microprocessor of this type, the electronic triggering device can be connected directly to the internet by appropriate software in the former and can function in response to the appropriate security codes. Therefore, for example an explosion in Germany which is monitored, checked and triggered via the internet from Australia is conceivable using this technology.

35

Supplementary safety features, such as automatic deactivation or ignitions with specific, person-based identification (ID) only are possible.

- 5 Time stage-dependent (inputting fixed addresses) and triggering units freely programmable in time or interval.

Emulating systems already on the market with the  
10 advantages:

- no retraining of staff
- existing ignition systems can be taken on.

15

Further advantages:

Only one legally stipulated authorisation for one system. This authorisation can be transferred to all  
20 further systems (plurality of systems).

Flexible voltage level and signal codes.

25 Production and delivery of unprogrammed triggering units (blanks). The customer has the opportunity to create his own system as required.

30 As microprocessors are predominantly produced for automotive sectors, there is an expanded temperature range not normally produced in customised chips. This property can be exploited without additional expenditure.

35 Triggering units known to us, such as detonators, are preferably produced using chip-on-board technology. This

requires a lot of know-how in the production of the safety-relevant electronics, so they can only be produced by highly trained personnel. The product is made more expensive as a result. If a microprocessor accommodated as standard in a housing is used it can be assembled using SMD technology. This reduces the production costs as it is a widely used production technology which can be mastered across the world.

Owing to the use of microprocessors, rapid reaction to market demands is possible without hardware modifications. The market demand is converted by software and can go directly into production after it has been qualified by the company.

15           Owing to the use of microprocessors, a rapid reaction to  
new legal requirements is possible without hardware  
modifications. The requirement is converted by software  
and can go directly into production after it has been  
20   qualified by the company.

Owing to the use of microprocessors, rapid reaction to new safety regulations is possible without hardware modifications. The requirement is converted by software and can go directly into production after it has been qualified by the company.

An embodiment of a triggering unit according to the invention is described hereinafter with the aid of a circuit diagram in Fig. 1:

6/7: input lines, in practice predominantly the electrical connection to a control unit.

- 10: suppressor circuit, for example in the form of series resistors or parallel resistors or voltage- and/or current-limiting semiconductor elements, arc-over sections etc.
- 5
- 11: data coupler for level-adjusted reading in of the information transmitted via 6/7 and for emitting (via 6/7) the information generated in the microprocessor 20.
- 10
- 12: rectifier, for unipolar operation of the electronics (no position-oriented assembly of the triggering units by the user required) and for rectifying the signals in the event that
- 15 information is currently being transmitted via alternating voltage signals.
- 8/9: main current supply branch
- 20 13: voltage regulator, provides a generally constant voltage for the microprocessor 20.
- 20: microprocessor.
- 25 4/5: microprocessor current supply branch.
- 21: level-adjusted data input to microprocessor 20.
- 30 22: data output to data coupler 11.
- 24: trigger signal for initiating the ignition.

15: energy store, generally a capacitor, serves to supply current to the microprocessor 20 and to ignite the ignition element 17.

5 16: switching element for triggering the ignition element 17.

17: ignition element: EED (Electrical Explosive Device).

1. Triggering unit for initiating pyrotechnic elements with a control component, a rectifier (12), an energy store (15), a voltage regulator (13), a data coupler (11), a current limiter and a suppressor circuit (10), characterised in that the control component is a programmable microprocessor (20) with integrated programme memory.

2. Triggering unit according to claim 1, characterised in that the microprocessor (20) comprises at least

- data inputs (21) and data outputs (22) and a switching output (24),
- a data memory and
- an oscillator

3. Triggering unit according to claim 2, characterised in that the oscillator can be calibrated by software.

4. Method for operating a triggering unit according to any of claims 1 to 3, characterised in that the microprocessor (20) is loaded with a programme corresponding to the current requirements during production of the triggering unit or at least before use thereof.

5. Method according to claim 4, characterised in that the triggering characteristic of the triggering unit is determined by the programme to be loaded.

6. Method according to claim 4, characterised in that the triggering characteristic of the triggering unit is determined according to the type of control.
- 5 7. Method according to any of claims 4 to 6, characterised in that the microprocessor (20) can also process internet protocols.
- 10 8. Method according to any of claims 4 to 7, characterised in that the operating software is implemented at random instants on an unprogrammed triggering unit or higher order subassembly (such as detonators).
- 15 9. Method according to any of claims 4 to 8, characterised in that the programming lines of the microprocessor are used as data inputs and outputs.
- 20 10. Method according to any of claims 4 to 9, characterised in that the switching output (24) can be reinforced by discrete components
- 25 11. Method according to any of claims 4 to 10, characterised in that communication between the triggering unit and the ignition device can be uni- or bi-directional in a demand-driven manner.
- 30 12. Method according to any of claims 4 to 11, characterised in that the triggering unit and the ignition device can communicate using various media, such as metallic conductor (cable), optical fibre, ultrasound or high frequency.

# Abstract of the Disclosure

The invention relates to a triggering unit for initiating pyrotechnical elements. The inventive unit comprises a control component, a rectifier (12), an energy store (15), a voltage regulator (13), a data coupling device (11), a current limiter and a suppressor circuit (10). The aim of the invention is to enable an up to now unknown variety of variants pertaining to characteristics and functionality without having to change the hardware or the design of the chip. To this end, the control component is a programmable microprocessor (10) with an integrated program memory.



WO 01/23827

PCT/EP00/08897

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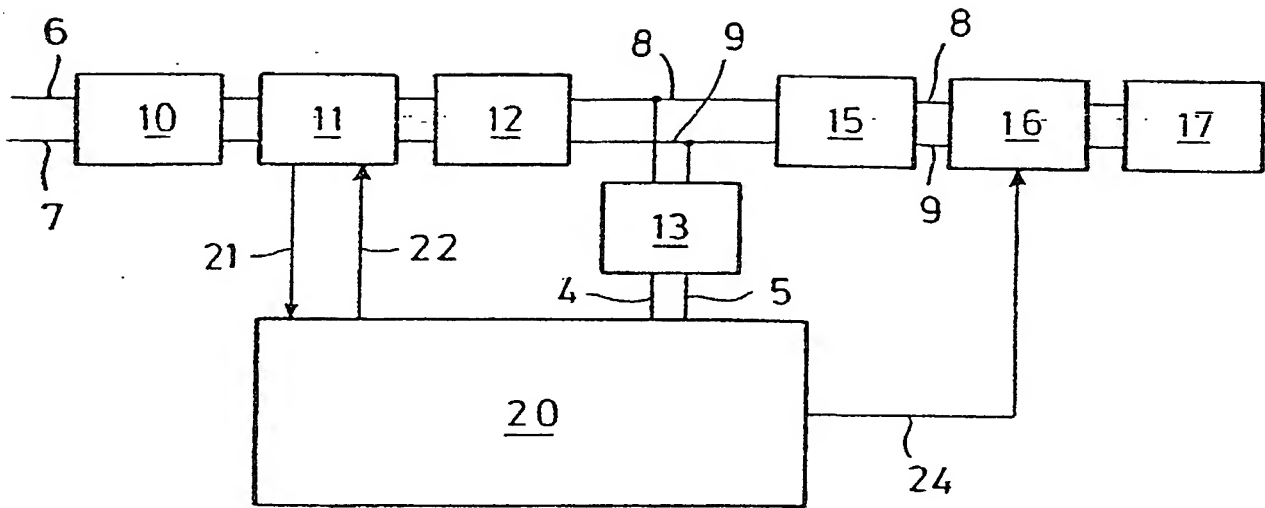
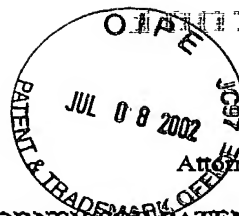


Fig. 1

28. JUN. 2002 9:57

DN PATENTABTEILUNG

NR. 874 S. 7



Attorney's Docket No.: 306.41404X00

### DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that: my residence, post office address and country of citizenship are as stated below, next to my name; I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **TRIGGERING UNIT CONTROLLED BY A MICROPROCESSOR FOR UNITIZING PYROTECHNIC ELEMENTS**

the specification of which

is attached hereto.

X

was filed on March 14, 2002 as

United States Application Number 10/071,000

or PCT International Application Number \_\_\_\_\_

and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

#### Prior Foreign Application(s)

#### Priority Claimed

199 46 291.7  
(Number)

DE  
(Country)

29/09/1999  
(Day/Month/Year Filed)

Yes No

100 17 703.4  
(Number)

DE  
(Country)

8/04/2000  
(Day/Month/Year Filed)

Yes No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

\_\_\_\_\_  
(Application Number)

\_\_\_\_\_  
Filing Date

\_\_\_\_\_  
(Application Number)

\_\_\_\_\_  
Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Number)

Filing Date

(Status -- patented,  
pending, abandoned)

(Application Number)

Filing Date

(Status -- patented,  
pending, abandoned)

11  
I hereby appoint: Donald R. Antonelli, Reg. No. 20,296; Melvin Kraus, Reg. No. 22,466; William I. Solomon, Reg. No. 28,565; Gregory E. Montone, Reg. No. 28,141; Ronald J. Shore, Reg. No. 28,577; Donald E. Stout, Reg. No. 26,422; Alan E. Schiavelli, Reg. No. 32,087; James N. Dresser, Reg. No. 22,973; Carl I. Brundidge, Reg. No. 29,621; Paul J. Skwierawski, Reg. No. 32,173; and Robert M. Bauer, Reg. No. 34,487, my attorneys; of ANTONELLI, TERRY, STOUT & KRAUS, LLP with offices located at 1300 North Seventeenth Street, Suite 1800, Arlington, Virginia 22209, telephone: (703) 312-6600, fax: (703) 312-6666; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send all correspondence to:

Customer Number 020457  
ANTONELLI, TERRY, STOUT & KRAUS, LLP  
1300 North Seventeenth Street  
Suite 1800  
Arlington, VA. 22209

Direct all telephone calls and faxes to:

TEL: (703) 312-6600  
FAX: (703) 312-6666

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00  
Full Name of Sole/First Inventor Dirk HUMMEL  
Inventor's Signature [Signature] Date 25/06/02  
Residence Same as P.O. Box Address Citizenship German  
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Post Office Address Werkstraße 25, 45721 Haltern, Germany DEX

200  
Full Name of Second/Joint Inventor Jay PETZOLD  
Inventor's Signature [Signature] Date 12/6/02  
Residence Same as P.O. Box Address Citizenship German  
(City, State) (Country)  
Post Office Address Nonnenweg 108 a, 51503 Rösrath, Germany DEX

Full Name of Third/Joint Inventor Heinz SCHÄFER  
Inventor's Signature [Signature] Date 1

1007 1 1119 0301302

Residence Same as P.O. Box Address Citizenship \_\_\_\_\_  
(City, State) (Country)

Post Office Address Heidberger Schweiz 10, 28865 Lilienthal, Germany

470 Full Name of Fourth/Joint Inventor Ulrich STEINER

Inventor's Signature Ulrich Steiner Date 25/06/02

Residence Same as P.O. Box Address Citizenship German  
(City, State) (Country)

Post Office Address Maarstraße 31 b, 53842 Troisdorf, Germany DEX

Full Name of Fifth/Joint Inventor Andreas ZEMLA

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_

Residence Same as P.O. Box Address Citizenship \_\_\_\_\_  
(City, State) (Country)

Post Office Address Am Bergeracker 14, 53842 Troisdorf, Germany

Full Name of Sixth/Joint Inventor \_\_\_\_\_

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_

Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
(City, State) (Country)

Post Office Address \_\_\_\_\_

Full Name of Seventh/Joint Inventor \_\_\_\_\_

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Full Name of Eighth/Joint Inventor \_\_\_\_\_

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Full Name of Ninth/Joint Inventor \_\_\_\_\_

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_

Residence \_\_\_\_\_ Citizenship \_\_\_\_\_

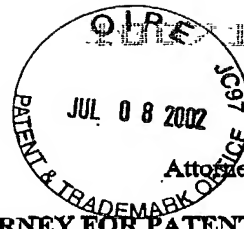
**Title 37, Code of Federal Regulations, Section 1.56**  
**Duty to Disclose Information Material to Patentability**

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by 991.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) Prior art cited in search reports of a foreign patent office in a counterpart application, and
  - (2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
  - (2) It refutes, or is inconsistent with, a position the applicant takes in:
    - (i) Opposing an argument of unpatentability relied on by the Office, or
    - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:
- (1) Each inventor named in the application;
  - (2) Each attorney or agent who prepares or prosecutes the application; and
  - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.



Attorney's Docket No.: 306.41404X00

**DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION**

As a below named inventor, I hereby declare that: my residence, post office address and country of citizenship are as stated below, next to my name; I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **TRIGGERING UNIT CONTROLLED BY A MICROPROCESSOR FOR UNITIZING PYROTECHNIC ELEMENTS**

the specification of which

is attached hereto.

Xwas filed on March 14, 2002 asUnited States Application Number 10/071,000

or PCT International Application Number \_\_\_\_\_

and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)Priority  
Claimed199 46 291.7  
(Number)DE  
(Country)29/09/1999  
(Day/Month/Year Filed)Yes No100 17 703.4  
(Number)DE  
(Country)8/04/2000  
(Day/Month/Year Filed)Yes No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

                      
(Application Number)                      
Filing Date                      
(Application Number)                      
Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:



Residence Same as P.O. Box Address Citizenship German  
(City, State) (Country)  
Post Office Address Heidberger Schweiz 10, 28865 Lilienthal, Germany DEX

Full Name of Fourth/Joint Inventor Ulrich STEINER

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence Same as P.O. Box Address Citizenship \_\_\_\_\_  
(City, State) (Country)  
Post Office Address Maarstraße 31 b, 53842 Troisdorf, Germany

5-00  
Full Name of Fifth/Joint Inventor Andreas ZEMLA

Inventor's Signature Zemla Date 12.06.02  
Residence Same as P.O. Box Address Citizenship German  
(City, State) (Country)  
Post Office Address \_\_\_\_\_

REICHENSTEIN 18, 53804 MUCK, GERMANY

Full Name of Sixth/Joint Inventor \_\_\_\_\_ DEX

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
(City, State) (Country)  
Post Office Address \_\_\_\_\_

Full Name of Seventh/Joint Inventor \_\_\_\_\_

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
(City, State) (Country)  
Post Office Address \_\_\_\_\_

Full Name of Eighth/Joint Inventor \_\_\_\_\_

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
Residence \_\_\_\_\_ Citizenship \_\_\_\_\_  
(City, State) (Country)  
Post Office Address \_\_\_\_\_

Full Name of Ninth/Joint Inventor \_\_\_\_\_

Inventor's Signature \_\_\_\_\_ Date \_\_\_\_\_  
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